

New species of *Amyntas* Kinberg, 1867 from the Philippines (Oligochaeta: Megascolecidae)

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New species of *Amyntas* Kinberg, 1867 from the Philippines (Oligochaeta: Megascolecidae). - Six new *Amyntas* are described from the Philippines: *Amyntas isarogensis* sp. n., *Amyntas malinaoensis* sp. n., *Amyntas philippinensis* sp. n., *Amyntas mindoroensis* sp. n., *Amyntas halconensis* sp. n. and *Amyntas bacoensis* sp. n. *Amyntas isarogensis* sp. n. and *Amyntas malinaoensis* sp. n. have a proandric male sexual system and small penes within enlarged prostatic ducts. *Amyntas philippinensis* sp. n. has spermathecal pores in 4/5, *Amyntas mindoroensis* sp. n. has spermathecal pores in 4/5, 5/6, *Amyntas halconensis* sp. n. has spermathecal pores in 4/5, 5/6, and 6/7, and *Amyntas bacoensis* sp. n. has spermathecal pores in 4/5, 5/6, 6/7, and 7/8. These last four species also have small hoods over the male pores. *Amyntas halconensis* sp. n. and *Amyntas bacoensis* sp. n. were only collected in soils, while the other 4 species were collected in both soils and arboreal habitats. All 6 new species lack genital markings in the spermathecal segments. Descriptions of the new species are provided, including illustrations of the ventral view, male pore region, and spermathecae.

Keywords: Earthworms - *Amyntas* - Megascolecidae - Oligochaeta - Philippines - taxonomy.

INTRODUCTION

Philippines earthworms have never been collected in an organized manner. All 19th and 20th century accounts of Philippine earthworms were based on haphazardly collected specimens that eventually came to the attention of specialists (James, 2004). Beddard (1912) recorded 4 species of *Amyntas* out of 9 *Pheretima*-complex group species from Luzon Island. Recently Joshi *et al.* (2000), recorded *Amyntas corticis* (Kinberg, 1867) from Ifugao Rice Terraces. The previously known Philippine *Amyntas* belong to 6 species: *A. albobrunneus* (Beddard, 1912), *A. americanorum* (Beddard, 1912), *A. orientalis* (Beddard, 1912), *A. robustus* (Vaillant, 1889), *A. sodalis*

(Beddard, 1912) and *A. corticis* (Kinberg, 1867). However, Beddard's (1912) four species descriptions lack information on the caecum location, so their placement in *Amyntas* must be considered provisional. Types of these species are not locatable (Reynolds & Cook, 1976). The northern part of Luzon apparently lacks indigenous *Amyntas* (James, unpublished data). Furthermore, Beddard's species have some features in common with endemic Philippine *Pithemera* (James *et al.*, 2004), leading us to suspect that the four species are actually *Pithemera*.

In this study, specimens were collected from February to July 2001, on Luzon and Mindoro Islands, mainly in forests on isolated volcanic peaks or large mountain ranges. Material was found in soils and litter layers by digging and hand sorting from 23 localities on Luzon, the Batanes Islands, Mindoro Island, and Catanduanes Island, with a total of 142 collecting stations. Arboreal habitats were also manually searched; these included leaf axils of palms and Pandanaceae, organic debris trapped in various ferns, and layers of mosses and vascular plant epiphytes. In this paper, 6 species of *Amyntas* new to science are reported from the Philippines. The genus *Amyntas* is the largest genus of the *Pheretima*-complex group (Sims & Easton, 1972), consisting of more than 500 species. Ranges of individual *Amyntas* species are limited when known, and most species are probably endemics except for *A. hilgendorfi*, *A. corticis* and other peregrines. However, *Amyntas* is not common in the Philippines, and was only collected at 4 localities: Mt. Isarog, Mt. Malinao, Mt. Halcon, and Mt. Baco. Each of the six new species was found in only one locality.

Holotypes and paratypes are deposited in the National Museum of the Philippines Annelid collection (NMA). Paratypes are deposited in the Field Museum of Natural History (FMNH), and Museum of Natural History of Geneva (MHNG).

DESCRIPTIONS

Amyntas isarogensis sp. n.

Figs 1A-B

Material: Holotype: One clitellate (NMA 0003750): Philippines, Mt. Isarog (13° 39.65' N, 123° 22.28' E), 1987 m, soil, 15 May 2001, S. W. James, M. Levi, P. Nillos, & J. Ffitch colls. 3 paratypes: 1 clitellate (NMA 0003756), 1 clitellate (FMNH 10017), 1 clitellate (MHNG 34812): Same data as for holotype. Other material: Same data as for holotype, 10 clitellate, 1 a clitellate specimens; Mt. Isarog (13° 39.79' N, 123° 21.79' E), 1340 m, arboreal, 3 a clitellate, 13-14 May 2001; Mt. Isarog (13° 39.65' N, 123° 22.28' E), 1987 m, arboreal, 2 a clitellate, 15 May 2001; Mt. Isarog (13° 39.70' N, 123° 22.07' E), 1745 m, soil, 9 clitellate, 9 a clitellate, 15 May 2001, S. W. James, M. Levi, P. Nillos, J. Ffitch colls.; Mt. Isarog (13° 40' N, 123° 22' E), 1560 m, 4 clitellate, Dec. 1993, L. Heaney coll.

Etymology: The species is named for its type locality.

Diagnosis: Spermathecal pores in 7/8, 8/9. Male sexual system proandric, male pores on penes in chamber formed by enlarged prostatic duct opening on 0.4-0.5 mm male porophore, openings 0.1-0.5 mm diameter; three pairs of genital papillae in male field.

Description: Red-brown dorsal pigment. Dimensions 45-99 mm by 3.7-4.2 mm at segment x, 3.3-3.5 mm at xxx, 3.3-3.4 mm at clitellum; body cylindrical throughout, segments 93-98. Setae regularly distributed around segmental equators, numbering 42 at vii, 56 at xx; 6-9 between male pores, size and distance regular; setal formula

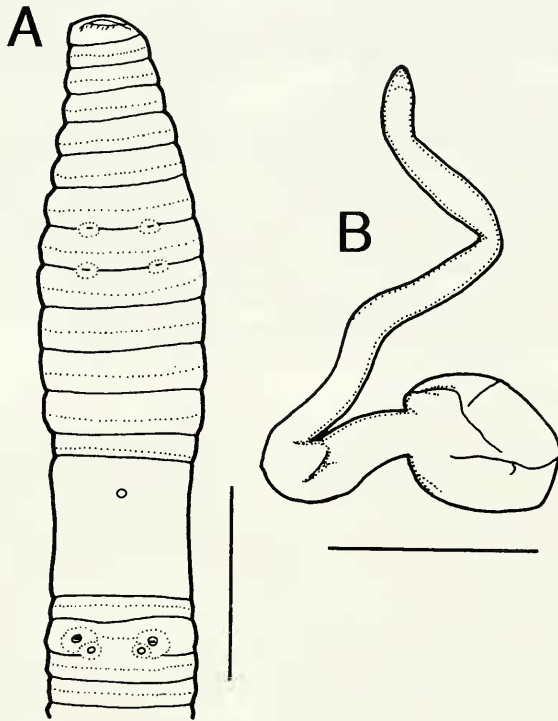


FIG. 1

Amynthus isarogensis sp. n. A: ventral view; B: spermathecae. Scale bars = 5 mm (A), 2 mm (B).

AA:AB:YZ:ZZ = 4:2:2:3 at xiii. Female pore single in xiv, 0.25 mm oval shape. First dorsal pore 12/13. Clitellum annular xiv-xvi; setae invisible externally.

Male pores superficial on 0.4-0.5 mm male porophore, openings 0.1-0.5 mm diameter. Between male pores paired postsetal circular 0.3 mm genital papillae xviii, two pairs genital papillae pre-, postsetal xviii, protuberant, dark color, hardened. Spermathecal pores in 7/8, 8/9, ventral, open pores in furrows next to bump on edge of segments. Genital markings absent.

Septa 5/6-6/7 thin, 7/8 thick, 8/9, 9/10 absent, 10/11-13/14 thin. Gizzard large globular in viii-x. Intestine begins in xvii. Typhlosole simple low fold about 1/6 lumen diameter from xxvii. Intestinal caeca simple, originating in xxvii, extending anteriorly about to xxiv, each consisting of a finger-shaped sac. Esophageal hearts four pairs in x-xiii, ix lateral large in left side.

Ovaries in xiii. Paired spermathecae in viii, ix; ampulla small pouch, duct thick, as long as ampulla; diverticulum stalk long slender, ental half not muscular, ectal half muscular, chamber long, slender; no nephridia on spermathecal ducts. Male sexual system proandric, testes and funnels in x in paired ventral sacs. Seminal vesicles in xi only. Prostates xviii extending to xvi-xix; duct muscular, spindle-shaped with large lumen in thick central part, narrowing to very small ectally, opening of male pore on

small penis inside small chamber entirely within body wall; glandular portions of prostates consist of one or two lobes. Genital markings glands sessile or very short stalk xviii.

Remarks: *Amyntas isarogensis* sp. n. has a very unusual proandric male sexual system. *Amyntas formosae* Michaelsen, 1922 and several unpublished species (James, unpub. data) from Taiwan and *A. pataniensis* Michaelsen 1896 from Halmahera and Batjan Islands of Indonesia are the only other known proandric *Amyntas*. The Taiwan species are octothecal and the Indonesian has numerous genital markings in the spermathecal segments and in the male field area of xvii-xxi. These two species also lack the expanded prostatic duct and penes found in *Amyntas isarogensis* sp. n. and the following (Michaelsen, 1896, 1922).

Amyntas malinaoensis sp. n.

Figs 2A-B

Material: Holotype: One clitellate (NMA 0003751): Philippines, Mt. Malinao, Albay Province (13° 25.98' N, 123° 37.63' E), 852 m, soil, 10 May 2001, S. W. James & A. Castillo colls. 3 paratypes: 1 semiclitellate (NMA 0003757), 1 clitellate (FMNH 10018), 1 clitellate (MHNG 34813): Same data as for holotype. Other material: Same data as for holotype, 1 semiclitellate, 1 a clitellate specimens; Mt. Malinao, Albay Province (13° 23.96' N, 123° 37.16' E), 1035 m, soil, 1 clitellate, 11 May 2001; Mt. Malinao, Albay Province (13° 23.96' N, 123° 37.16' E), 1035 m, arboreal, 2 clitellate, 11 May 2001, S. W. James & A. Castillo colls.

Etymology: The species is named for its type locality.

Diagnosis: Spermathecal pores in 7/8, 8/9. Male sexual system proandric, male pores 1/3 circumference apart on 0.8 mm male porophore, openings 0.2 mm diameter, genital papillae glands stalked.

Description: Brown dorsal pigment. Dimensions 35-46 mm by 3.0 mm at segment x, 2.7 mm at xxx, 2.6 mm at clitellum; body cylindrical throughout, segments 66-76. Setae regularly distributed around segmental equators, numbering 47 at vii, 49 at xx; 4-7 between male pores, size and distance irregular; setal formula AA:AB:YZ:ZZ = 1.5:1:2:2 at xiii. Female pore single in xiv, 0.2 mm small oval shape. First dorsal pore 11/12 or 12/13. Clitellum annular xiv-xvi; setae invisible externally.

Male pores 1/3 circumference apart on 0.8 mm male porophore, openings 0.2 mm diameter. Between male pores paired circular presetal 0.3 mm genital papillae, 0.2 mm papilla postsetal near the male pores in lateral margin, distance between male pores 1.5 mm. penis visible within male pores. Spermathecal pores in 7/8, 8/9, ventral, conspicuous, spermathecal pores area thickened slightly. Genital markings absent.

Septa 5/6-7/8 thin, 8/9, 9/10 absent, 10/11-13/14 thin. Gizzard globular in viii-x. Intestine begins in xv. small paired lymph glands from xxvii along the dorsal vessel. Typhlosole low simple fold about 1/5 lumen diameter from xxvii. Intestinal caeca simple, originating in xxvii, extending anteriorly about to xxiv, each consisting of a finger-shaped sac. Esophageal hearts four pairs in x-xiii, ix in right side only, viii, vii lateral, reduced.

Ovaries in xiii. Paired spermathecae in vii, viii; ampulla mushroom-shaped, duct thick, diverticulum stalk thick muscular in ectal half, stalk twice ampulla length, chamber pepper-shaped or long cone; no nephridia on spermathecal ducts. Male sexual system proandric, testes and funnels in ventral paired sacs in x, joined ventrally. Seminal vesicles large in xi only. Prostates xviii extending to xv-xx; duct muscular

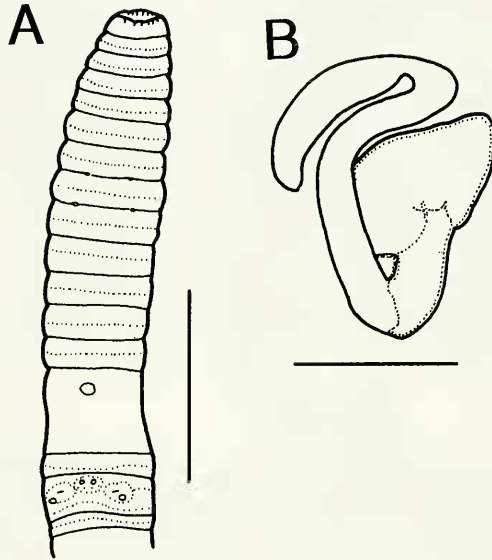


FIG. 2

Amynthus malinaoensis sp. n. A: ventral view; B: spermathecae. Scale bars = 5 mm (A), 1 mm (B).

spindle-shaped with large lumen in thick central part, narrowing to very small ectally, opening of male pore on small penis inside small chamber entirely within body wall, glandular portions of prostates consist of one main lobe. Genital papillae of xviii with stalked glands corresponding approximately in number to the externally visible papillae, no circular muscle layer in stalks.

Remarks: The species also has the unusual proandric male sexual system with penes. *Amynthus malinaoensis* sp. n. differs from *Amynthus isarogensis* sp. n. in having shorter body length, more narrowly spaced dorsal and ventral gaps, less distance between male pores and less distance between spermathecal pores. Also, *Amynthus isarogensis* sp. n. has paired postsetal circular genital papillae between the male pores, but *Amynthus malinaoensis* sp. n. has paired circular presetal genital papillae between the male pores and one postsetal papilla near the male pores. Intestinal origin is xvii in *Amynthus isarogensis* sp. n. but xv in *Amynthus malinaoensis* sp. n., and the genital papillae glands have longer stalks in *Amynthus malinaoensis* sp. n. than in *Amynthus isarogensis* sp. n.

Proandry is uncommon within the family Megascolecidae, and also within the *Pheretima* complex of genera. Among the latter, most species have a holandric system (testes present in x, xi), with proandric (testes restricted to x) or metandric (testes only in xi) less common.

***Amynthus philippinensis* sp. n.**

Figs 3A-B

Material: Holotype: One clitellate (NMA 0003752): Philippines, Mindoro Island, Mt. Halcon summit (13° 15.83' N, 120° 59.62' E), 2603 m, mainly under woody plants, which in this location are shrubs from 0.5-1.5 m high, 8 July 2001, S. W. James & M. Levi colls. 2 paratypes:

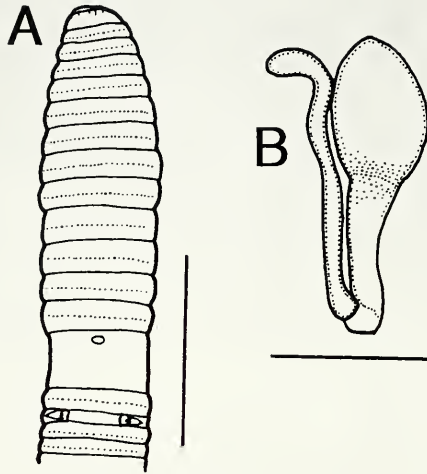


FIG. 3

Amynthus philippinensis sp. n. A: ventral view; B: spermathecae. Scale bars = 5 mm (A), 1 mm (B).

1 clitellate (FMNH 10019) Mindoro Island, Mt. Halcon (13° 15.91' N, 120° 59.33' E), 2500 m, summit ridge mossy forest, worms abundant in soil and arboreal soils, 8 July 2001; 1 clitellate (MHNG 34814) Mindoro Island, Mt. Halcon (13° 15.83' N, 120° 59.62' E), 2603 m, soil, 8 July 2001, S. W. James & M. Levi colls.

Etymology: The species is named for its country of origin.

Diagnosis: *Amynthus* with spermathecal pores in 4/5. Male pores under small half moon-shaped hoods, distance between male pores 1.3 mm, hearts x lacking.

Description: Brown dorsal and ventral pigment. Dimensions 70 mm by 3.1 mm at segment x, 2.8 mm at xxx, 2.6 mm at clitellum; body cylindrical throughout, segments 100. Setae regularly distributed around segmental equators, numbering 47 at vii, 48 at xx; 0 between male pores, size and distance regular; setal formula AA:AB:YZ:ZZ = 2:1.5:2:2 at xiii. Female pore single in xiv, 0.4 mm oval shape. First dorsal pore 12/13. Clitellum annular xiv-xvi; setae visible externally.

Male pores superficial near lateral margins of ventrum in xviii, within elevated area, male pores under small half moon-shaped hoods, distance between male pores 1.3 mm. Spermathecal pores in 4/5, ventral, very small, inconspicuous. Genital markings absent.

Septa 5/6-6/7 thick, 7/8-8/9 thin, 9/10 absent, 10/11-13/14 thin. Gizzard globular in viii. Intestine begins in xv, small paired lymph glands from xxvii along the dorsal vessel. Typhlosole simple fold about 1/4 lumen diameter from xxvii. Intestinal caeca simple, originating in xxvii, extending anteriorly about to xxiv or xxv, each consisting of a finger-shaped sac. Esophageal hearts three pairs in xi-xiii, x absent, ix lateral large in right side.

Ovaries in xiii. Paired spermathecae in v; ampulla small pouch, duct longer than ampulla, diverticulum with slender stalk, longer than ampulla, equally slender chamber also longer than ampulla; no nephridia on spermathecal ducts. Male sexual system holandric, testes and funnels in ventral paired sacs in x, xi. Seminal vesicles large in

xi, xii. Prostates xviii extending to xvi-xx; duct thick, muscular, looped, both glandular portions consist of two main lobes.

Remarks: In Sims & Easton (1972) the key leads to those species whose first spermathecal pores are in 4/5, which include the holandric bithecate taxa *A. swanus* Tsai, 1964, *A. megascolidioides* Goto & Hatai, 1899, the *pauxillulus* group, and the *hexathecus* group. All have 2 or more pairs of spermathecal pores. Therefore *Amynthas philippinensis* sp. n. is unique in the genus by having one pair of spermathecae in v. The hooded male pores are also unusual, but this characteristic is shared with other Mindoro Island *Amynthas*. The species was collected from Mt. Halcon, near the summit at 2603 m elevation and in mossy forest on the summit ridge. *Amynthas philippinensis* sp. n. was found in soil under low shrubs on the wind swept summit, and in soil and arboreal habitats in mossy forest lower on the summit ridge.

Amynthas mindoroensis sp. n.

Figs 4A-B

Material: Holotype: One clitellate (NMA 0003753): Philippines, Mindoro Island, Mt. Halcon (13° 16.01' N, 120° 59.05' E), 2442 m, soil low on the summit ridge, 8 July 2001, S. W. James & M. Levi colls. 2 paratypes: 1 clitellate (FMNH 10020), 1 clitellate (MHNG 34815): Same data as for holotype. Other material: Mt. Halcon (13° 17.94' N, 120° 00.21' E), 1584 m, arboreal, 1 clitellate, 1 a clitellate, 6 July 2001, S. W. James, A. Castillo & M. Levi colls; Mt. Halcon (13° 17.94' N, 120° 00.21' E), 1584 m, soil, 1 clitellate, 7 July 2001, S. W. James, A. Castillo & M. Levi colls; Mt. Halcon (13° 16.01' N, 120° 59.05' E), 2442m, soil low on the summit ridge, 4 a clitellate, 8 July 2001; Mt. Halcon (13° 15.91' N, 120° 59.33' E), 2500 m, arboreal, 1 clitellate, 8 July 2001, S. W. James & M. Levi colls; Mt. Halcon (13° 15.91' N, 120° 59.33' E), 2500 m, soil, 2 clitellate, 2 a clitellate, 8 July 2001, S. W. James & M. Levi colls; Mt. Halcon (13° 17.89' N, 120° 59.87' E), 1185 m, riparian forest, 1 clitellate, 1 a clitellate, 9 July 2001, S. W. James & M. Levi colls.

Etymology: The species is named for its type locality on Mindoro Island.

Diagnosis: Spermathecal pores in 4/5, 5/6. Male pores under small half-moon shaped hoods, distance between male pores 2.3 mm; paired 0.8 x 0.4 mm oval genital papillae between male pores, hearts of x lacking.

Description: Brownish dorsal pigment. Dimensions 32-48 mm by 2.7-3.5 mm at segment x, 2.3-3.3 mm at xxx, 2.2-2.4 mm at clitellum; body cylindrical throughout, segments 68-96. Setae regularly distributed around segmental equators, numbering 49 at vii, 48 at xx; size and distance regular; setal formula AA:AB:YZ:ZZ = 2.5:1.5:2:4.5 at xiii. Female pore single in xiv, 0.3 mm oval shape. First dorsal pore 12/13. Clitellum annular xiv-xvi; setae visible externally.

Male pores superficial near lateral margins of ventrum in xviii, within elevated area, male pores under small half-moon shaped hoods, distance between male pores 2.3 mm. Between male pores 0.8 x 0.4 mm paired oval genital papillae, dark color, hardened, no setae between male pores. Spermathecal pores in 4/5, 5/6, ventrally, very small, inconspicuous. Genital markings absent.

Septa 5/6-6/7 thick, 7/8 thin, 8/9-10/11 absent, 11/12-12/13 thick, 13/14 thin. Gizzard globular in viii-x. Intestine begins in xv, small paired lymph glands from xxvii along the dorsal vessel. Typhlosole simple fold about 1/4 lumen diameter from xxvii. Intestinal caeca simple, originating in xxvii, extending anteriorly about to xxiv, each consisting of a finger-shaped sac. Esophageal hearts three pairs in xi-xiii, x absent, ix, viii lateral reduced, vii lateral.

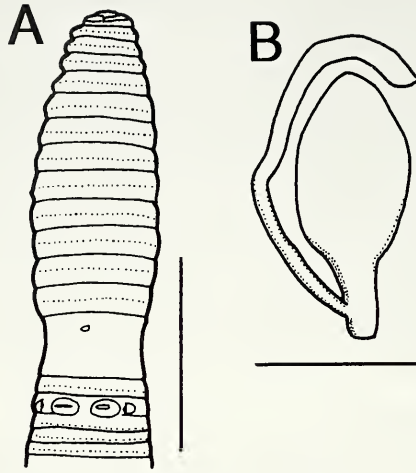


FIG. 4

Amynthus mindoroensis sp. n. A: ventral view; B: spermathecae. Scale bars = 5 mm (A), 1 mm (B).

Ovaries in xiii. Paired spermathecae in v, vi; ampulla large pouch, duct thick, diverticulum thin, long slender stalk, long slender chamber, longer than ampulla; no nephridia on spermathecal ducts. Male sexual system holandric, testes and funnels in ventrally joined paired sacs in x, xi. Seminal vesicles large in xi, xii. Prostates xviii extending to xvii-xx; duct thick in middle, short, muscular, both glandular portions consist of two main lobes; slight glandular development above genital papillae in xviii.

Remarks: *Amynthus mindoroensis* sp. n. keys to the Taiwanese *A. swanus* in Sims & Easton (1972). *Amynthus mindoroensis* sp. n. appears to be related to *A. swanus* by location of spermathecal pores *A. swanus* but, it is separated easily by the male pore region. Genital papillae of *Amynthus mindoroensis* sp. n. are paired ovals between the male pores, but *A. swanus* has a tubercular surface surrounded anteriorly and posteriorly by oblique wide ridges. *A. swanus* lacks the hoods over the male pores and has hearts in x. *Amynthus mindoroensis* sp. n. was collected from Mt. Halcon in the same habitats as the previous species, from both soil and arboreal locations. *Amynthus mindoroensis* sp. n. differs from *Amynthus philippinensis* sp. n. in having shorter body length, more widely spaced dorsal gap, and more widely spaced male pores. Also it is easily distinguished by having genital papillae and an additional pair of spermathecae in vi.

***Amynthus halconensis* sp. n.**

Figs 5A-B

Material: Holotype: One clitellate (NMA 0003754): Philippines, Mindoro Island, Mt. Halcon (13° 15.83' N, 120° 59.62' E), 2603 m, mainly under woody plants, which in this case are shrubs from 0.5-1.5 m high, 8 July 2001, S. W. James & M. Levi colls. 3 paratypes: 1 clitellate (NMA 0003758), 1 clitellate (FMNH 10021), 1 clitellate (MHNG 34816): Same data as for holotype. Other material: Same data as for holotype, 4 clitellate specimens; Mt. Halcon (13° 15.83' N, 120° 59.62' E), 2603 m, soil, 5 clitellate, 2 a clitellate, 8 July 2001, S. W. James & M. Levi colls.

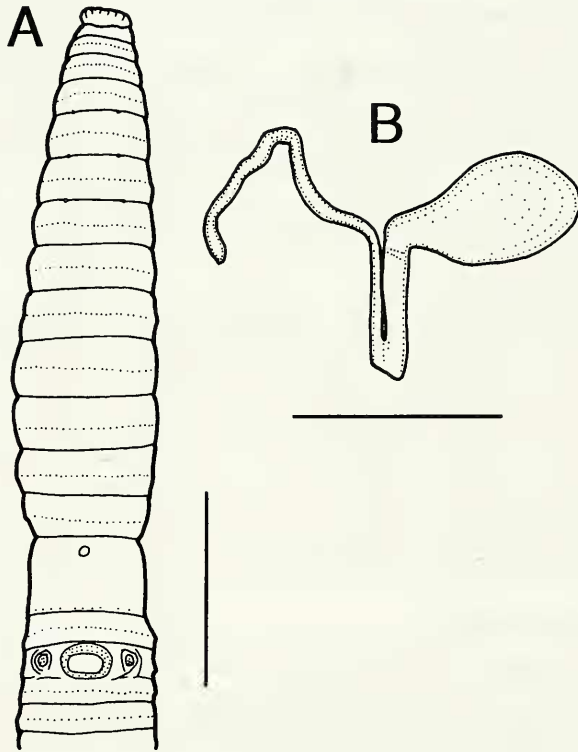


FIG. 5

Amynthus halconensis sp. n. A: ventral view; B: spermathecae. Scale bars = 5 mm (A), 2 mm (B).

Etymology: The species is named for its type locality.

Diagnosis: Spermathecal pores in 4/5-6/7. Male pores under small hoods near lateral margin, distance between male pores 2.2 mm; between male pores one large rectangular 0.9 x 0.5 mm papilla.

Description: Dark gray dorsal pigment. Dimensions 67-86 mm by 3.5-3.8 mm at segment x, 3.3-3.5 mm at xxx, 3.0-3.3 mm at clitellum; body cylindrical throughout, segments 111-118. Setae regularly distributed around segmental equators, numbering 44 at vii, 49 at xx; 0 between male pores, size and distance irregular; setal formula AA:AB:YZ:ZZ = 3:1.5:2:3.5 at xiii. Female pore single in xiv, 0.4 mm small oval shape. First dorsal pore 12/13. Clitellum annular xiv-xvi; setae visible externally.

Male pores superficial under small hoods near lateral margin of ventrum in xviii within elevated area, distance between male pores 2.2 mm. Between male pores one large rectangular 0.9 x 0.5 mm papilla. Spermathecal pores in 4/5-6/7, in small flat porophores, pore opening appears black. Genital markings absent.

Septa 5/6-7/8 thin, 8/9, 9/10 absent, 10/11 thin, 11/12-13/14 thick. Gizzard large globular in viii-x. Intestine begins in xv. Typhlosole simple fold about 1/3 lumen diameter from xxvii. Intestinal caeca simple, originating in xxvii, extending anteriorly

about to xxiii, each consisting of a finger-shaped sac. Esophageal hearts four pairs in x-xiii, ix, viii, vii lateral.

Ovaries in xiii. Paired spermathecae in v, vi, vii; ampulla globular pouch, duct medium thickness, as long as ampulla, extremely thin diverticulum three times duct length, ental 1/3 slender chamber; no nephridia on spermathecal ducts. Male sexual system holandric, testes and funnels in ventral paired sacs in x, xi. Seminal vesicles in xi, xii. Prostates xviii extending to xv-xx; both glandular portions consist of 3-4 lobes, duct thick, muscular. Genital papilla of xviii with large sessile gland corresponding to the large square papilla.

Remarks: *Amyntas halconensis* sp. n. keys to the *pauxillulus* group in Sims & Easton (1972), which is composed of three species, *A. dignus* (Chen, 1946), *A. pauxillulus* (Gates, 1936), and *A. swanus* (Tsai, 1964). The species has the same number and location of spermathecal pores as this group but has a different male field containing a single midventral papilla and has hooded male pores, unlike any of the other three (Gates, 1936; Tsai, 1964). *A. swanus*, *A. dignus* and *A. pauxillulus* have no genital papillae. The intestinal origin of *Amyntas halconensis* sp. n. is in xv, while it is in xvi in *A. dignus* and *A. pauxillulus*. The testis sacs also differ, being paired in the new species and annular or horseshoe-shaped in *A. dignus* and *A. pauxillulus*.

Amyntas bacoensis sp. n.

Figs 6A-B

Material: Holotype: One clitellate (NMA 0003755): Philippines, Mindoro Island, Mt. Baco (12° 38.73' N, 121° 01.25' E), 72 m, soil, 13 July 2001, M. Levi & P. Nillos colls. 3 paratypes: 1 semiclitellate (NMA 0003759), 1 semiclitellate (FMNH 10022), 1 semiclitellate (MHNG 34817): Same data as for holotype. Other material: Same data as for holotype, 1 semiclitellate, 20 acitellate specimens.

Etymology: The species is named for its type locality near Mt. Baco.

Diagnosis: Spermathecal pores in 4/5-7/8. Male pores on 0.4 mm round protuberant male patches, distance between male pores 3.7 mm; genital papillae paired ovals 1.3 x 0.7 mm, near lateral in xvii, extending to 16/17, 17/18.

Description: Light-brown dorsal and ventral pigment. Dimensions 57-68 mm by 3.0-3.3 mm at segment x, 3.0-3.1 mm at xxx, 3.0-3.2 mm at clitellum; body cylindrical throughout, segments 91-102. Setae regularly distributed around segmental equators, numbering 41 at vii, irregular, 64 at xx, regular; between male pores, size and distance irregular; setal formula AA:AB:YZ:ZZ = 2:1.5:2:2 at xiii. Female pore single in xiv, 0.3 mm small oval shape. First dorsal pore 12/13. Clitellum annular xiv-xvi; setae visible externally.

Male pores superficial near lateral margin of ventrum in xviii, on 0.4 mm round protuberant male patches, distance between male pores 3.7 mm. Genital papillae paired oval 1.3 x 0.7 mm, near lateral in xvii, dark, hardened, extending to 16/17, 17/18. Four pairs spermathecal pores in 4/5-7/8, mid-lateral, inconspicuous. Genital markings absent.

Septa 5/6-7/8 thin, 8/9 absent, 9/10, 10/11 very thin, 11/12, 12/13 thick, 13/14 thin. Gizzard globular in viii-ix. Intestine begins in 1/2xv, small paired lymph glands from xxvii along the dorsal vessel. Typhlosole simple fold about 1/3 lumen diameter from xxvii. Intestinal caeca simple, originating in xxvii, extending anteriorly about to

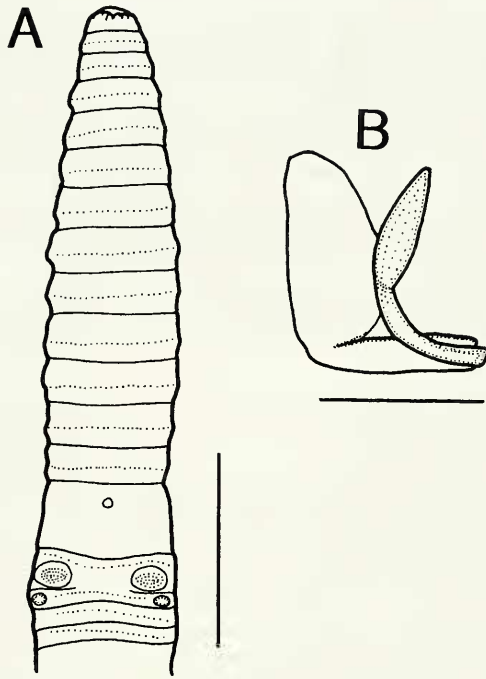


FIG. 6

Amynthus bacoensis sp. n. A: ventral view; B: spermathecae. Scale bars = 5 mm (A), 1 mm (B).

xxiv, each consisting of a large finger-shaped sac. Esophageal hearts four pairs in x-xiii, ix, viii, vii lateral.

Ovaries in xiii. Paired spermathecae in v-viii; ampulla small pouch, duct medium thickness, shorter than ampulla, diverticulum chili pepper-shaped, with slender stalk, as long as ampulla; no nephridia on spermathecal ducts. Male sexual system holandric, testes and funnels in ventral paired sacs in x, xi. Seminal vesicles in xi, xii. Prostates xviii extending to xvi-xx; both glandular portions consist of 2 lobes, duct short, muscular. Genital papillae of xviii 1.0 x 0.6 mm, with large sessile glands corresponding approximately to the externally visible oval papillae.

Remarks: In Sims & Easton (1972) *Amynthus bacoensis* sp. n. keys to a couplet giving a choice between three and five thecal segments, corresponding to the *pauxillulus* group and *hexathecus* group respectively. Therefore *Amynthus bacoensis* sp. n. has a unique spermathecal battery composed of pairs in v-viii. This species also has unique genital papillae in xvii. It differs from its Mindoro congeners by lacking the hoods over the male pores, in addition to other characteristics.

The proandric species from Luzon have male genitalia showing convergent evolution to *Pheretima* species, in having a penis-like structure within a copulatory chamber. This is an interesting parallel development of a mechanism for internal sperm transfer, compared to *Pheretima*. However, the chamber is intramural and associated with an enlarged prostatic duct which may serve as an ejaculatory bulb. In contrast,

Pheretima have an extramural (coelomic) copulatory chamber and no bulb-like development of the prostatic ducts. In contrast to their apomorphic male terminalia, the species from Luzon have spermathecal pores in 7/8 and 8/9, which is a common arrangement in the Megascolecidae.

The four Mindoro species have modified locations of spermathecal pores: 4/5, 4/5-5/6, 4/5-6/7 and 4/5-7/8 respectively, and ordinary prostatic ducts. Three species have an unusual male field feature, the hoods over the male pores. This has not been found in other *Amyntas*, though some Taiwan species have a tendency towards growing a flap of tissue over the male pores (James *et al.*, 2004).

Key to the species of the genus *Amyntas* known from the Philippines

- | | | |
|----|--|--------------------------------------|
| 1 | Proandric | 2 |
| - | Holandric | 3 |
| 2 | Intestinal origin in xv | <i>Amyntas malinaoensis</i> sp. n. |
| - | Intestinal origin in xvii | <i>Amyntas isarogensis</i> sp. n. |
| 3 | One pair of spermathecae in segment v | <i>Amyntas philippinensis</i> sp. n. |
| - | More than one pair of spermathecae | 4 |
| 4 | Two pairs of spermathecae | 5 |
| - | More than two pairs of spermathecae | 6 |
| 5 | Spermathecal pores at 4/5, 5/6 | <i>Amyntas mindoroensis</i> sp. n. |
| - | Spermathecal pores at 7/8, 8/9 | <i>Amyntas robustus</i> |
| 6 | Three pairs of spermathecae | 7 |
| - | More than three pairs of spermathecae | 8 |
| 7 | Spermathecal pores at 4/5, 5/6, 6/7 | <i>Amyntas halconensis</i> sp. n. |
| - | Spermathecal pores at 6/7, 7/8, 8/9 | <i>Amyntas americanorum</i> |
| 8 | Four pairs of spermathecae | 9 |
| - | More than four pairs of spermathecae | 10 |
| 9 | Spermathecal pores at 4/5, 5/6, 6/7, 7/8 | <i>Amyntas bacoensis</i> sp. n. |
| - | Spermathecal pores at 5/6, 6/7, 7/8, 8/9 | <i>Amyntas corticis</i> |
| 10 | Spermathecae in V-IX | 11 |
| - | Spermathecae in IV/V-VII/VIII | <i>Amyntas orientalis</i> |
| 11 | 18-20 setae between male pores | <i>Amyntas albobrunneus</i> |
| - | 8-10 setae between male pores | <i>Amyntas sodalis</i> |

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